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Subject: Dwarf Mistletoe Suppression Needs In Three Recreation Sites On The Sequoia National Forest (FPM Report No. C97-3)

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ABSTRACT

Three recreation sites on the Tule River Ranger District have infestations of red fir dwarf mistletoe. The severity and effects of mistletoe are different at each location, but the vegetation at all three sites would benefit from suppression treatments. Forest Pest Management encourages the District to submit a dwarf mistletoe suppression project proposal and will help prepare the required documentation.

OBSERVATIONS AND DISCUSSION

On October 7, 1997, I visited three recreation sites on the Tule River Ranger District, Sequoia National Forest. Also present was Deborah Walker from the District Silviculture Staff. Each site had true fir infected with dwarf mistletoe. The objectives of the visit were to confirm the presence of mistletoe, evaluate its severity and potential future effects, and determine if suppression is warranted.

Vegetation management plans for each area were similar -- to eliminate hazard trees and reduce mistletoe infections to tolerable levels. If justified, Forest Pest Management funds would be requested and used for mistletoe control but not hazard tree removal. The three sites were: Quaking Aspen Campground, Lewis Camp Trailhead, and Golden Trout Pack Station.

Quaking Aspen Campground

This campground lies at a elevation of 7200 feet and contains Jeffrey pine, red fir and white fir. The only recently killed trees were several red fir poles. Many red and white fir had dead branches scattered within their live crowns. Dwarf mistletoe (*Arceuthobium abietinum* f.sp. *magnifica*) is restricted almost entirely to red fir in the southern portion of the facility (the biology of each pest mentioned is explained at the end of this report.) Infection severity is generally slight to moderate with an occasional heavily infected tree. We used the Hawksworth 6-class rating system.

The long-term health of this site would benefit greatly from dwarf mistletoe treatment. It is at a stage where the parasite could be reduced to relatively

harmless levels without significantly changing the character of the vegetation. Annosus root disease, caused by Heterobasidion annosum, was found at three different campsites (# 6, 26 and 30). The presence of this pathogen was verified by discovering viable conks inside of true fir stumps. This form of H. annosum will infect true fir and giant sequoia but not pines or incense cedar. We saw no recent mortality or tree failures that could be attributed to root disease. The impact of this root pathogen on campground vegetation remains unclear.

Golden Trout Pack Station

Overstory vegetation at this site is red fir and Jeffrey pine between 20 and 40 inches DBH, while the understory is red fir and Jeffery pine in the 6-10 inch DBH size class. Red fir dwarf mistletoe is present in both overstory and understory trees. Of the 3 sites, this one has the worst infestation, which can be described as moderate to severe. Many overstory trees have ratings of 5 or 6 and some understory trees are infected in the upper one-third crown. While white fir is not a host for red fir dwarf mistletoe, it is not very common at the pack station.

Lewis Camp Trailhead

Tree cover at this location (7600 feet elevation) is mainly white fir. There are scattered dead trees, trees with top kill and trees with branch mortality. Inspection of the standing dead and down trees showed that they are all red fir, and only a few living red fir remain on the site. Some of these are infected by dwarf mistletoe. There is no mistletoe in the white fir. Down trees, both red and white fir, showed galleries of the fir engraver (Scolytus ventralis). The poor crown condition of several fir suggest infection by root disease fungi, but no evidence of root pathogens was found.

While this site is in the worst condition as far as mortality and declining tree health, it has the most limited opportunities for dwarf mistletoe suppression because of the low red fir population. There are only a few red fir that need to be treated for dwarf mistletoe. Tree health problems here may be more closely related to overstocked tree aggregations and poor soil conditions due to unregulated vehicle and stock activity.

DISCUSSION/CONCLUSIONS

Each of the sites would benefit from dwarf mistletoe suppression. The Tule River/Hot Springs Ranger District has experience in mistletoe suppression and has recently completed several highly successful projects. The general guidelines for treating infected conifers are presented below. Please contact John Pronos [(209) 532-3671 X242] if you have any questions or need additional information.

JOHN PRONOS
Service Area Plant Pathologist

DWARF MISTLETOE SUPPRESSION TREATMENTS

A number of treatment methods are available for the suppression of dwarf mistletoe in recreation areas. They can be used singly or in combination. The method or methods chosen for a particular site depends heavily upon the management goals for that site. Stand structure and composition and the intensity of the infection should also be considered. Below is a list of alternative treatments which FPM can recommend, and guidelines for their implementation. The direct methods are those which can be funded with FPM suppression funds. In keeping with the theme of integrated pest management, these treatments are designed to promote overall stand vigor by suppressing dwarf mistletoe impact.

Direct Suppression Methods

1. Broom Pruning

Objective: To extend tree life and maintain individual treated trees on a site as long as possible.

Guidelines: Remove dwarf mistletoe witches' brooms from high-value trees only if they will have at least 30% live crown after removal of the brooms. This treatment will not eliminate mistletoe from the stand, nor will it prevent future spread. It is most often used in areas that have little or no understory.

2. Tree Removal

Objective: To remove trees expected to die within ten to fifteen years, to prevent the build-up of bark beetles, and to reduce dwarf mistletoe seed in the stand.

Guidelines: Remove trees with a DMR of 5 or 6, or a rating of 4 with mistletoe in the upper one-third of the crown. Such trees generally are not prunable, pose a threat to adjacent uninfected pines, and have a higher probability of dying within 10 to 15 years or during the next drought. It is also advisable to remove infected pines that will have less than 30 percent live crown after pruning, or are growing in dense aggregations where removal of selected individuals would benefit neighboring uninfected or slightly infected pines. Remove all trees having bole infections at a point less than six inches in diameter. Bole infections are not serious from the standpoint of spreading mistletoe, but they deform and/or lead to mortality of small trees and failure of large trees.

3. Creation of Buffer Strips

Objective: To limit or stop the spread of dwarf mistletoe into a treated area from adjacent infested areas.

Guidelines: Use host-free strips to prevent mistletoe from re-entering the control area or, when the parasite is not eliminated, from leaving the site. Buffer strips should be at least as wide as the height of the highest mistletoe plants in the adjacent infested stand. Examples of existing buffers include meadows, roads, rivers, clearings, and aggregations or plantings of non-host trees. Construction of new roads, structures, or campsites can also be used to create buffer zones and eliminate pockets of heavily infected trees.

4. Branch Pruning/Eradication

Objective: To reduce or eliminate dwarf mistletoe seed in the stand and improve tree vigor.

Guidelines: For trees with DMR of 3 or less, or a rating of 4 and no mistletoe in the upper one-third of the crown, prune all lower branches, both healthy and diseased, at the bole up to and including the second whorl of branches above the highest visible mistletoe infection. Experience has shown that despite removing branches up through the highest infection or even one more whorl, latent infections almost certainly appear in three to five years. Whenever possible, avoid removing more than 50% of a tree's live crown. Pruning of all infected branches in infected trees in an attempt to eradicate this pest requires careful adherence to these guidelines, and will have the greatest chance of success when used on isolated high-value trees or in areas of one acre or less where infection is light. Do not attempt eradication if the pruning will result in a tree with a crown of less than 30%, or if the tree will be exposed to continued infection from adjacent infected trees. It is difficult to completely eliminate dwarf mistletoe from a tree without at least two treatments. Plan to reenter and retreat if needed at least twice after the first entry.

Indirect Suppression Methods

1. Thinning

Objective: To improve stand growth and tree vigor.

Rationale: Despite direct dwarf mistletoe treatment, the benefits from reducing or eliminating infection may be offset by continuing competition for growing space in overcrowded stands. Even where mistletoe is absent, overstocking contributes to poor tree vigor and an unnecessarily high risk of death from bark beetle attack. Although privacy and esthetic requirements in campgrounds may prevent thinning to stocking levels optimum for timber-producing forests, some thinning may be necessary if campground stands are to maintain vigor and resistance to pest attack.

2. Favoring and Planting Non-Host Conifers and Hardwoods

Objective: To eventually replace infected trees with uninfected trees and to lessen future spread of dwarf mistletoe.

Rationale: Because western dwarf mistletoe (*A. campylopodium*) infects neither the hardwoods nor most of the conifers growing with susceptible ponderosa and Jeffrey pines, managers may favor these non-hosts so that they become a larger component of the campground stands. Selected individuals or small aggregations of these non-host species may be retained as buffers to movement of the parasite, or as eventual replacements for severely infected pines that cannot be removed during mistletoe treatment. Wherever there are pure stands of severely infected pines, planting of non-susceptible species may be the only way to ensure that new trees replace the pines that die or are removed. However, for plantings to survive in campgrounds, managers must be prepared to protect them with stakes, fencing, drip irrigation, a visitor information program, and other expensive treatments.

3. Rotation of Campground Usage

Objective: To provide long-term recovery of heavily infested areas.

Rationale: Successful mistletoe treatment and thinning are sometimes incompatible with campground management, and partial treatments are usually not biologically or economically sound. In such cases it may be advisable to close a campground so that treatment can be carried out properly and stands revegetated where necessary. Although closing part or all of a campground for 10 to 15 years may seem impossible in the short run, the advantages that accrue from healthier stands and a greater mix of tree species and ages may offset the temporary loss of the site. Severely infested campground stands will continue to decline until the campgrounds finally must be closed; it may be cheaper to revitalize the stands while possible, rather than wait until the old grounds must be closed and completely regenerated. And, when campgrounds must be closed because of a shortage of money and personnel, managers could select for closure those sites where mistletoe treatment and stand rejuvenation are most needed.

INTEGRATED PEST MANAGEMENT

Dwarf mistletoe is often only part of a larger set of stand, site, and pest factors. Before treatment, each campground should be evaluated thoroughly to ensure that all pests are considered in the management alternative(s) selected. For example, treatment of dwarf mistletoe-infected pines might not be economical in an annosus (*Heterobasidion annosum*) root disease center, due to the high probability of tree mortality. However, if such trees still appear healthy five years after the project is concluded, treatment would then be justified to limit dwarf mistletoe spread from the trees.

When tree removal and pruning does take place, treat all freshly cut stump surfaces with borax to prevent the establishment of *H. annosum*. Also treat green slash generated by pruning or tree removal to reduce the risk of pine engraver beetle (*Ips* spp.) buildup. Slash created in the spring or early summer should be either lopped and scattered, piled and burned while green, chipped, or removed to a location lacking susceptible hosts.

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